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Study of Impact of Stressful Environment on Total White Blood Cell Count in Canesugar Manufacturing Employees

KEYWORDS: White blood cell count, work place environment,cane sugar manufacturing employees.

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ABSTRACT *Sugarindustry is one of the important agrobased Industry. It plays a key role in National economy. In Maharashtra state sugar industries are concentrated in satara,Sangli and Kolhapur district .ItProvides employment to rural peoples. In present Investigation randomly selected sixty workers form Canesugar manufacturing department was assessed for total white blood cell count , it was observed that the total white blood cells count was found to be incresed in workers working at juice and sugar house section as compare to control group general office workers,at the same time total white blood cell count was lowered in pan section workers.*

INTRODUCTION

In industrial situations the workers are exposed tovarious physical and social conditions which have been found to affect their health and efficiency. In sugar industry workplace environment is adverseworkers are exposed to high intensity noise, excessive heat, high concentration of dust, fumes of toxic gases, chemicals, weilding operations, exccessive workload, inadequate illumination, inadequate space, shift work, night shift, etc. which affect the health of the worker.

In present investgation randomly selected ten workers from the different sections of cane sugar manufacturing departmentviz: juice, pan, centrifugal, sugar house, godown and boiling house engineering work section were assessed. The environmental stress factors in cane sugar manufacturingdepartment constitutes toxic fames of Sulphur dioxide gas, baqasse dust, sugar dust, high temperature and high intensity noise.

The Laboratory of Physiology, Department of Zoology, Shivaji University, Kolhapur(India) is engaged in extensive work in toxicology, occupational physiology and some applied problems in textile, foundry, dairy and sugar industry. In many jobs, the workers were exposed to various types of health hazards and environmental stress factors

Haematological studies on powerloom workers were carried out by Sawantet al. (1996). Haematological changes in rat in response to cotton dust exposure were carried out by Sawant and Dubal (1997). Haematologicalstudies on textile workers in Ichalkaranji wascarried out by Gaikwad (1997). The effect of cotton dust and or associated endotoxin (s) on platelet count of rat were studied by Sanandamet al. (2000). Cotton dust inducedneutrophilia in powerloom workers at Ichalkaranji were studied by Sawantet al. (2000). The effects of cotton dust and associated endotoxin(s) on red cell count in textile environment were studied by Sawant and Sanandam (2001).

In sugat industry manufacturing department crystalline sugar is manufactured from extracted cane juice coming from engineering section. It constitutes following sections:

I. Juice section- It involves boiling the juice until it begins to thicken and sugar begins to crystallize and the clarification of juice by sulphtation
II. Pan section- Spinning the crystals in a centrifuge to remove the syrup, producing raw sugar.
III. Centrifugal section- Shipping the raw sugar to a refinery where it is washed and filtered to remove remaining non-sugar ingredients i.e molasses and color.
IV. Sugar house section- Crystallizing, drying and packaging the refined sugar
V. Godown section –Lifting carrying and storage of sugar bags.

The Boiling house (Engineering work) workers are engaged in mentainance of machineries.

MATERIAL AND METHODS.

Material

The present investigation was carried out in Padmaphushan Krantiveer Nagnath Anna Nayakawadi Coperative sugar industry walwa. Nationaly industry is renowned for recovery,providing employment to the three hundred forty four skilled and unskilled workers from surrounding area.

Methods

The sampling of dust was done by high volume sampler. Sound level at various sections was recorded by sound level meter in decibel(dB).Recording of thermal data such as dry bulb temperature was made in different sections during working hours .The sampling of sulpher dioxide was done by Sodium TetrachloromercurateMethod.Nitrogen oxides as nitrogen dioxide are collected by bubbling air through a sodium hydroxide solution to form a stable solution of sodium nitrite. The nitrite ion produced during sampling is determined calorimetrically by reacting the exposed absorbing reagent with phosphoric acid, sulphanilamide and N (t – naphthyl) ethylene diaminedihydrochloride.The method is applicableto collection of 24 hours samples in the field and subsequent analysis in the laboratory.The total white blood cell count was done by Neubarauer's counting chamber.

RESULTS AND DISSCUSSION

The working and living conditions in suger industry manufacturing department are adverse, it is difficult to maintain the health of the worker.

TABLE.NO.1.DUST CONCENTRATION AT DIFFERENT SECTIONS OF CANE SUGAR MANUFACTURING DEPARTMENT.

Sr.No.	Section	SPM µg/Nm^3	RSPM µg/Nm^3
1.	Juice Section	625	204
2.	Pan Section	385	105
3.	Centrifugal Section	197	73
4.	Sugar House Section	975	328
5.	Godown Section	212	102

Table no.1 indicates the dust concentration at various processing units of cane sugar manufacturing section the higher

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concentration of lime dust was found at juice section i.e 204 µg/Nm^{3}respirable dust . In sugar house section the concentration of sugar dust is significantly high i.e 328 µg/ Nm^3

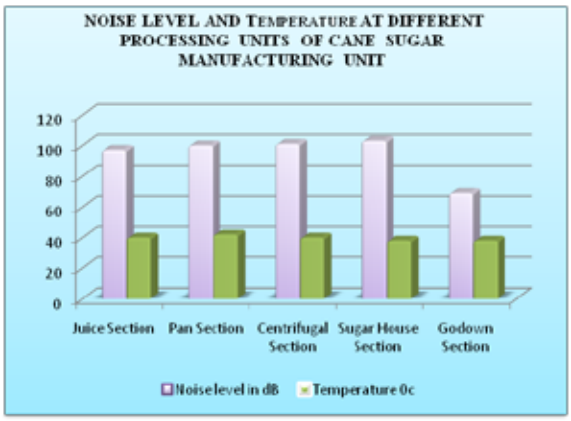

Figure 1

Figure 1indicatesnoise level in (dB) and temperature in(^{0}C) at different processing units of cane sugar manufacturing unit.The high intensity noise is generated at the sugar house section (103dB) and in centrifugal section (101dB).The temperature level is higher at pan section (420c).

TABLE NO 2.CONCENTRATION OF SULPHUR DIOXIDE AND NITROGEN OXIDES AT DIFFERENT SECTIONS OFCANE SUGAR MANUFACTURING DEPARTMENT.

Sr. No.	Section	Noxµg/Nm^3	$So_{2\mu g}$/Nm^3
1	Juice	22.09	93.14
2	Pan	38.94	15.76
3	Centrifugal	11.04	08.45
4	Sugar House	3.12	6.17
5	Godown	2.02	4.12

Table no 2.Indicatesconcentration of sulphur dioxide and nitrogen oxides at different sections ofcane sugar manufacturing department. It was found that the higher concentration of sulphur dioxide 93.14µg /Nm^3.

Section	Height(Cm)	Weight(Kg)	Age(yrs)	Employment time (Months)
General Office	42.4±6.687	159.4±5.542	58.9±11.030	138.8±19.668
Boiler House (Engineering Section)	161.1±4.149	53.5±8.182	41.7±6.567	162.9±3.665
Juice	163.5±5.930	57.7±8.616	39.8±5.8	148.8±12.264
Pan	164.1±4.458	63.1±7.505	40.3±7.54	159.1±14.364
Centrifugal	164.9±5.587	60.9±6.935	39.2±7.72	155.5±10.384
Sugar House	164±5.333	68.4±12.765	42.7±6.36	165.4±19.591
Godown	165.9±5.685	65.7±6.360	40.8±7.33	154.3±13.590

Values are means ±S.D.

TABLE 3: ANTHROPOMETRIC MEASUREMENT OF WORKERS AT DIFFERENT SECTIONS OF CANE SUGAR MANUFACTURING DEPARTMENT.

Table no. 3 indicates anthropometric measurement of workers at different sections of cane sugar manufacturing department. The age of workers ranges from 24 to 58 years and the workers rendered long period of service 28 years.

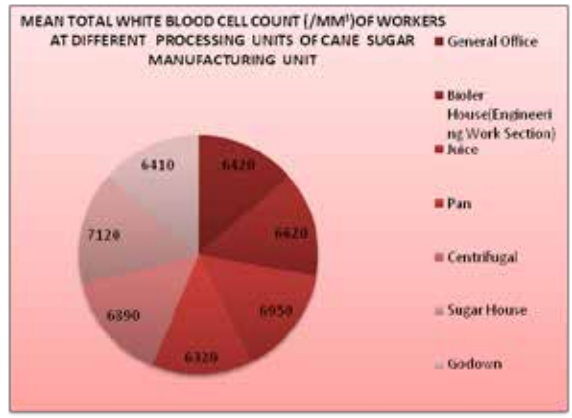

Fig no. 2 indicates mean total white blood cell count in workersat different sections of cane sugar manufacturing department. The total white blood cell count was significantly high in juice section workers and nextly the sugar house section workersThe total white blood cell count was found to be decreased in pan section workers.

In present investigation it was observed that the total white blood cell count is significantly high in workers working at juice and sugar house section .The high level of total white blood cell may be attributed to the bodiesresponse to inhaled dust particles high concentration of lime dust at juice section and sugar dust at sugar house section . An increase in the number polymorphonuclear leukocytes in airways of guinea pigs exposed to water extracts of bale cotton has been reported (Rylander and Nordstand 1974). Sharma in(2001)reported,leukocytosis, neutrophilia and elevated ESR and increased level of quantitative immunoglobulins and C-creative proteins with hypersensitivity pneumonitis .In the hemp and cotton textile workers exhibits an increase in the number of polymorphonuclear leucocytes in the nasal fluids (Marchant et al.1975).Peripheral blood leukocytosis with neutrophillia observed in hypersensitivity pneumonitis. (Schule2002). Joseph et al. (1991)indicates a decrease in WBC count neutrophilia, eosinophilia and lymphocytopenia in albino rats as the effect of acute heat stress. In present investigation similar observations are found in pan section workers where the temperature was 42^{o}c. Major functions of white blood cells are accomplished in the tissues and in blood cells can result from the distribution of cells inside the vascular compartment ,changes in the flow of cells in to the blood ,the egress of cells from the blood or due to the combination of all .These changes provides some insite concerning the pathophysiologic significance of the variations in the white blood cells in toxic states. These changes may be of short duration and can easily missed, They may persist for day or weeks. The author has planned working in this line.

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